



# Detroit Diesel Series 50 Propane Engine Development, Certification, and Demonstration Project

## Subcontractor

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## Subcontract Number

ACC-5-14390-01

## Performance Period

3/95-6/97

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## Objective

To develop, certify, and demonstrate a dedicated propane (LPG) heavy-duty engine (DDC Series 50) for transit bus applications. The dedicated propane engine should provide competitive energy efficiency (maximum thermal efficiency greater than 38% at high load points) with natural gas engines while meeting the following low engine emission standards:



*Corpus Christi transit bus for demonstrating the DDC Series 50 propane engine*

Engine Emission Targets (with Oxidizing Catalyst)  
(g/bhp-h)

<u>NO<sub>x</sub></u>	<u>THC</u> (Hydrocarbons)	<u>CO</u>	<u>PM</u> (Particulates)
2.5	1.0	2.0	0.05

The engine will be rated at 250 hp at 2100 rpm with peak torque of 890 ft-lb at 1200 rpm.

## Approach

To meet our emissions and horsepower goals, the LPG engine development work will include some engine modifications such as compression ratio, piston and ring design, cylinder head and valve seat design, and selection of specific engine components (fuel delivery system, engine control system, etc.) for LPG use. After we have designed and fabricated the Series 50 LPG engine, the engine will undergo mechanical durability and reliability testing. A series of tests will be conducted to ensure the engine components meet their durability and reliability



objectives (approximately 400,000 miles). Then a demonstration version of the DDC Series 50G/LPG engine will undergo complete emissions certification and deterioration testing. The engine will incorporate all additional engine and aftertreatment modifications that resulted from the durability testing.

For the demonstration part of the project, host sites (primarily transit properties) will be identified. Each host site will receive one, two, or three prototype engines with factory support. The engines will be installed in either new or current vehicles (transit buses, airport shuttles, etc.) and operated for at least 1 year. Data will be collected on vehicle operation, fuel consumption, maintenance costs, and overall operating costs.

## **Accomplishments**

Basic engine development work is complete. Five demonstration engines have been built so far. Three have been installed; the other two are awaiting, or currently undergoing, installation into buses. Preliminary determination of the host sites (Corpus Christi, Texas; Denver, Colorado; Orange County, California; and Halifax, Nova Scotia) has been made.

## **Future Direction**

To begin certification development and deterioration factor testing and launch demonstration phase. To have the most up-to-date technology and meet the project's schedule requirements, Detroit Diesel Corporation continues to engage in an ongoing consultation with propane industry experts.

## **Publications**

None to date.